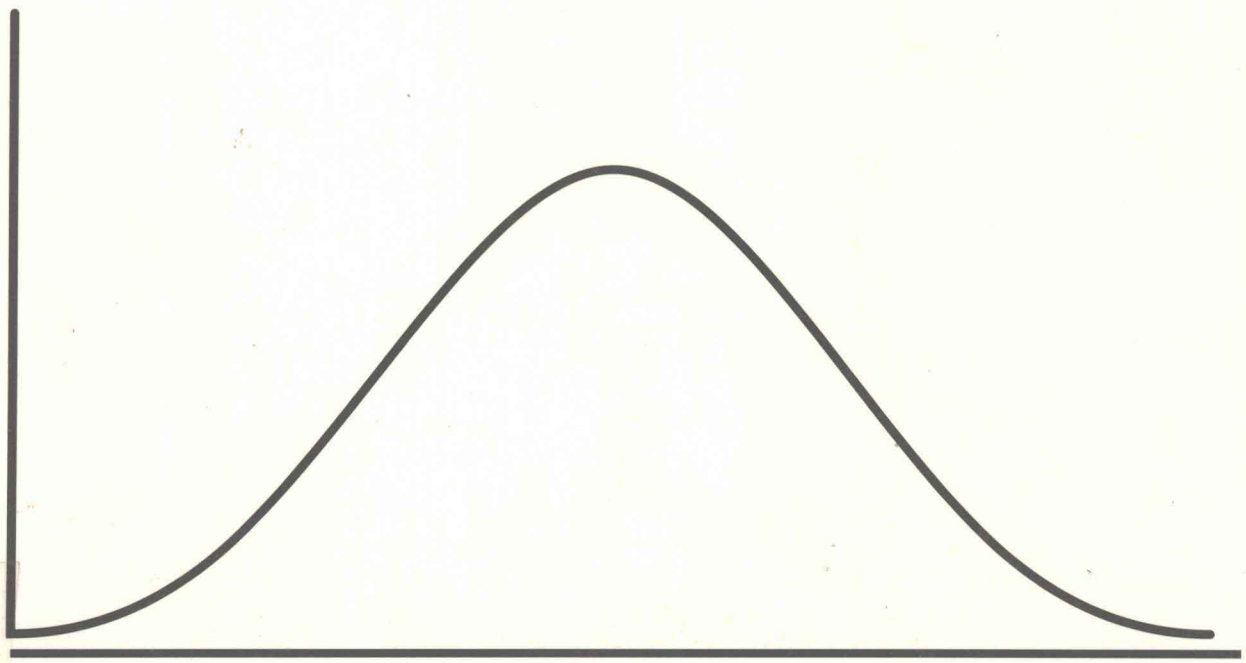
INTERPRETING BASIC STATISTICS

A Guide and Workbook based on Excerpts from Journal Articles



Zealure C. Holcomb

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INTRODUCTION

This book presents brief excerpts from research journals representing a variety of fields. The questions that follow each excerpt allow students to practice interpreting published research results.

The questions require students to apply a variety of skills including

1. locating specific information in statistical tables, figures, and discussions of results;

2. performing simple calculations to determine answers to questions not directly answered in the excerpts;

3. discussing the authors' decisions regarding reporting techniques;

4. describing and interpreting major trends revealed by data, including evaluating the authors' interpretations; and

5. evaluating procedures used to collect the data underlying the statistics presented.

Although the excerpts emphasize the "results" sections of the journal articles from which they were drawn, some information about procedures, such as sampling and measurement, are also included in order to put the results in context.

The appendices present four complete research articles so that students can study the structure of typical articles.

Some Assumptions Underlying the Development of this Book

A major assumption is that students will find materials based on actual research reports inherently more interesting than made-up examples that are often used in statistics textbooks.

It is also assumed that students will benefit by practicing with materials written by numerous authors; this allows them to see variations in the uses of statistics and in reporting techniques as they are actually used by practicing researchers.

Finally, it is assumed that a collection of complete research reports would produce too much material to be integrated into traditional statistics courses. Instructors of such courses are often pressed for time when covering just the

essentials. Hence, this book presents brief excerpts to conserve instructional time.

Cautions When Using this Book

Students should be aware that the exercises are based on excerpts from journal articles. Although the excerpts are in the original authors' own words, many important points made in the complete articles were omitted for the sake of brevity. Before generalizing from the excerpts, such as in papers written for other classes, students should read the full articles, which are available in most large academic libraries.

Although the answers to most of the questions are either right or wrong, some questions may have more than one good answer because they ask for subjective interpretations or speculation. At first, some students are surprised to learn that the interpretation of data is not always straightforward; yet, it is precisely because of this circumstance that practice is needed in interpreting research results as they actually appear in journals.

A statistical guide at the beginning of each exercise provides highlights that help in the interpretation of the associated excerpt. The guides are not comprehensive because it is assumed that students using this book are enrolled in statistics courses in which theoretical and computational concepts are covered in detail in their textbooks. Thus, the guides should be thought of as reminders of basic points to be considered when attempting the exercises.

Finally, students will discover occasional inconsistencies between what is recommended by their textbook authors and the analysis and reporting techniques employed by the authors of the excerpts. Variations are permitted by journal editors, and the excerpts in this book will help students prepare for reading research reports as they actually appear in journals. When taking tests in class, however, students should always conform to the recommendations made by their textbook authors or by their instructors.

Notes on the Layout of this Book

To minimize page turning while answering the questions, each exercise begins on a left-hand page and most of the questions are on the facing right-hand page. A page for notes has been placed between exercises, which allows removal of a completed exercise that is being collected as homework without removing any portion of the previous exercise. The pages are perforated to permit easy removal.

Acknowledgements

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CONTENTS

QUESTIONS FOR EXERCISE 1

1. The percentages in Table 2 were rounded to the nearest (circle one)

   A. whole number. B. tenth. C. hundredth. D. thousandth.

2. How many sixth-grade children responded?

3. What is the total number of children who responded?

4. What percentage of the fifth-grade children reported being afraid of the dark?

5. How many of the fifth-grade children reported being afraid of the dark?

6. How many of all children in all grades reported being afraid of death?

7. In addition to reporting the percentages for each category of fear, would it also have been desirable for the authors to report the numbers of cases (i.e., frequencies) such as the numbers that you calculated in response to questions 5 and 6 above? Explain.

8. In general terms, describe the developmental trend in fear of machinery (across grade levels).

9. In general terms, describe the developmental trend in fear of school (across grade levels).

10. The sum of the percentages across the first row (for fourth-grade students) is considerably greater than 100 percent. Speculate on the explanation for this.

11. The second footnote to Table 2 indicates that there were 393 responses. Is 393 the *sample size*? Explain.

12. If you were planning to summarize this study in a term paper on fears of nuclear war, would you mention the fact that all of the subjects were gifted? Explain.

13. If you were planning to summarize this study in a term paper on gifted children's fears, would you mention the sample size and origin of the sample? Explain.

14. Do you agree with the authors that it was better to ask "What are the things to be afraid of?" instead of "What are you afraid of?" Explain.

Notes:

EXERCISE 2

ENDING A CAREER IN A DECLINING INDUSTRY

STATISTICAL GUIDE

In random sampling each member of the population is given an equal and independent chance of being selected; this may be accomplished by drawing names from a hat or using a table of random numbers.

Demographics are background characteristics (i.e., variables) that are used to describe the subjects of a study. They are usually not the focus of the study. Examples of commonly used demographics are gender, age, and ethnicity.

Note that in the table below, dashes are used to represent percentages of zero.

EXCERPT FROM THE RESEARCH ARTICLE

A questionnaire was mailed to a random sample of 500 United Auto Workers retirees who had been employed in the Rouge auto plant in Dearborn, Michigan. All retirees were eligible for full pension benefits based on a combination of age and length of service. After a follow-up mailing two months later, about 40 percent returned the questionnaire. A comparison of the demographic characteristics of this sample with both U.S. Census data and other retired worker surveys suggests that this sample . . . reflects basic characteristics of auto workers as reported in the 1980 census (U.S. Bureau of the Census, 1980).

As Table 5 demonstrates, over two-thirds of those who retired at age 65 or older cited age as the primary reason for retirement, compared to one-tenth of the early retirees and less than one-fourth of those who retired between ages 62 and 64.

Table 5 Reasons for Retirement by Age at Retirement

	Age at retirement		
Reason for retirement	Under 62	Between 62-64	65 or older
Age	10.5	22.7	64.6
Ready to retire	10.5	48.9	14.6
Health problems	26.3	12.1	8.3
Plant closed	10.5	1.5	–
Benefits	10.5	3.0	–
Make way for younger workers	2.6	1.5	6.0
Bad work conditions/industry uncertainty	5.3	4.5	–
Family concerns	7.9	–	2.9
Enjoy life	7.9	1.5	2.1
Other	7.9	4.5	2.1
	100.0%	100.0%	100.0%
n =	76	66	48

SOURCE: Meyer, M. H. & Quadango, J. (1990). Ending a career in a declining industry: The retirement experience of male auto workers. *Sociological Perspectives, 33,* 51–62. Copyright 1990 by JAI Press, Inc. Reprinted with permission.

QUESTIONS FOR EXERCISE 2

1. What is the total number of subjects on which Table 5 is based?

2. Of the 76 subjects under age 62, how many reported that their reason for retirement was to enjoy life?

3. How many of the subjects who were 65 or older reported that their reason for retirement was because of bad work conditions/industry uncertainty?

4. For those subjects who were under 62, what was the least frequently cited reason for retirement?

5. In words (not numbers), describe the relationship between age at retirement and health problems as the reason for retirement.

6. In words (not numbers), describe the relationship between age at retirement and age as the reason for retirement.

7. Is the relationship between age at retirement and being ready to retire as a reason for retirement consistent across ages from the youngest to the oldest retirees? Explain.

8. Suppose that the authors had reported *only* numbers of cases in the table and had *not* reported percentages. (For example, in response to question 2 above, you calculated the number of cases for one cell.) Would such a table be more or less useful than the table actually presented? Explain.

9. The authors gave the table both a number and a title. Was this a good idea? Explain.

10. The authors mailed the questionnaire to a random sample of the population. In light of the response rate, do you believe that it was important for the authors to mention the demographic characteristics of those who responded? Explain. (Note: In the complete article, the authors describe the demographics in more detail than given in the excerpt.)

11. In the complete article the authors examined the relationship between age of retirement and several variables in addition to the reasons for retirement. What other variables might you wish to examine?

Notes:

EXERCISE 3

STUDENT ACCESS TO GUIDANCE COUNSELING

STATISTICAL GUIDE

A proportion is a part of one (1). For example, a proportion of .2 stands for two-tenths of one. The highest possible proportion is 1.00, and the lowest is 0.00.

To convert a proportion to a percentage, multiply by 100. For example, .2 x 100 = 20 percent.

To review percentages, read the statistical guide for Exercise 1.

EXCERPT FROM THE RESEARCH ARTICLE

[The] issues were investigated using *High School and Beyond* (*HS&B*), a large study of high schools and their students . . . . Our major analyses have been restricted to the 9,471 public high school students for whom there was test, questionnaire, and transcript file information.

One way of investigating how students arrive in their curricular tracks is simply to ask them. Such a query was included in the (*HS&B*) base-year questionnaire; we present the results in Table 1. More students report being assigned to their tracks than any other option.

Table 1 Proportions of public high school sophomores in each curriculum track reporting methods of track placement

	Curriculum track		
Method of track placement	Academic	General	Vocational
Only one offered	.02	.03	.03
Assigned	.33	.43	.37
Chose alone	.25	.23	.25
Chose with counselor*	.28	.19	.21
Chose with others	.13	.11	.13

*Includes four categories: chose with counselor only; chose with counselor and parent(s); chose with counselor and friend(s); chose with counselor, parent(s) and friends.

We have seen in Table 1 that students in the three curriculum tracks report different degrees of counselor assistance in placement into those tracks, with more of those in the academic track reporting counselor contact.

SOURCE: Lee, V. E. & Ekstrom, R. B. (1987). Student access to guidance counseling in high school. *American Educational Research Journal, 24,* 287–310.